

Application note

Advanced lead-acid batteries recognized as energy efficient backup solutions for data centers

Introduction

Data centers need reliable backup power systems, as even brief power outages can be detrimental for their business. Advanced lead-acid battery technologies, such as thin plate pure lead (TPPL), provide enhanced energy efficiency, long working life even in higher temperatures and help save energy while keeping the total cost of ownership down.

Lead-acid batteries have traditionally been the preferred backup power solution for the telecoms sector. They are also a popular backup power solution for data centers. Both industries require advanced power solutions.

Heat generation and temperature – are they issues?

The assumption that lead-acid batteries would generate a lot of heat is incorrect. Both conventional AGM batteries and TPPL batteries emit an insignificant amount of heat.

Usually, a stable +20°C temperature was required to achieve the best battery conditions. The PowerSafe®SBS® EON Technology® batteries have been designed for higher ambient temperatures, and have a design life of 15 years (7.5 years @ 30°C).

If the other equipment in the data center does not require a +20°C temperature, savings can be made via decreased energy consumption, as less cooling may be required.

Heat Generation is insignificant

$$Q \text{ watts} = V \text{ float} * I \text{ float} * 0.95$$

For a TPPL 100Ah 12V block

$$13.74 * 0.02 * 0.95 =$$

260mw per 12V block 100Ah

For lead calcium with float current 35mA per 100Ah

$$13.68 * 0.035 * 0.95 =$$

454mw per 12V block 100Ah

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Energy efficiency in focus

The TPPL technology brings significant improvements to energy efficiency, which is a key concern for data centers.

EnerSys® has developed a unique manufacturing process to create thin plate pure lead grids that measure only one millimetre thin compared to the conventional 2 - 4 millimetre thick plates. Using thin plates improves power density, i.e. gives more power in the same volume and mass, as more plates can be fitted in the same-sized cell. Using a stronger acid in the battery further enhances power density.

TPPL also lowers the energy consumption. We have measured up to 40% reduction in the energy required to maintain a battery fully charged, compared to a traditional lead-calcium battery with the same power.

Long working life

The TPPL batteries have been designed to last for a long time. The Datasafe® HX+ batteries have 10 to 12 years design life, which is classified as high performance according to the Eurobat guide.

Advanced TPPL batteries are virtually maintenance-free during their anticipated design life.

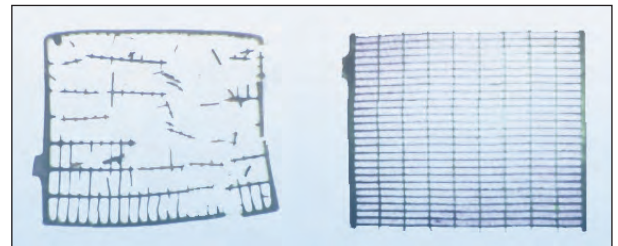
Thanks to very low self-discharging the TPPL batteries also store well. Their shelf life is up to 24 months between refresh charges (@ 20°C).

Effortless maintenance contributes to the low total cost of ownership.

Finally, the pure lead crystallography of the TPPL batteries with fine grain structure of the grid makes them highly resistant to corrosion. Pure lead grids with the same design life can be much thinner than cast lead calcium grids.

TPPL provides a 22% improvement in volumetric power density over conventional AGM

Conventional AGM	TPPL
offering 12V 101Ah	offering 12V 100Ah
Volume: 51cm long x11cm wide x 23.5 cm high = 13,183 cm ³	Volume: 39.5 cm long x 10.8 cm wide x 28.7 cm high = 12,243 cm ³
Watts per cell to 15 min @ 25°C = 296wpc	Watts per cell to 15 min @ 25°C = 337wpc



Grid at the end of life (The TPPL grid is on the right)

Conclusion

Selecting the optimal backup power application for a data center should be based on calculations consisting of the data center's requirements; load, performance, power, space and maintenance parameters and the cost. The application that best responds to these needs should be selected.

Enhances brought by technology evolution - energy efficiency, heat tolerance, corrosion resistance, energy savings, long storage and design/working life - make advanced lead acid batteries a viable backup power solutions for data centers and deliver power without interruption or data losses.

Featured products: PowerSafe®SBS®EON Technology® Datasafe®HX+



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